

Original Article

THE ASSOCIATION BETWEEN SOCIOECONOMIC STATUS AND KNOWLEDGE, ATTITUDES, AND PRACTICE OF ORAL HEALTHCARE IN ABBOTTABAD, PAKISTAN

Saveela Sadaqat¹, Abdul Manan², Muhammad Adnan Iqbal³, Sadia Rashid⁴, Syed Abir Hussain⁵, Annas Abdullah⁶

¹Department of Biochemistry, M Islam Dental College, Gujranwala

²Department of Oral Medicine, Islamic International Dental College, Islamabad

³Department of General Medicine, KMSMC Sialkot

⁴Department of Physiology, Frontier Dental College Abbottabad

⁵Department of Community Dentistry, Frontier Dental College Abbottabad

⁶House Officer, Frontier Medical and Dental College Abbottabad

ABSTRACT

Objectives: This cross-sectional study aimed to assess the association between socioeconomic status (SES) and the knowledge, attitude, and practice (KAP) of oral healthcare among patients in Abbottabad, Pakistan.

Materials and Methods: A cross-sectional study was conducted at the Frontier Medical and Dental College, Abbottabad, from December 2024 to February 2025. A convenience sample of 250 participants was recruited. While this method was pragmatic, it limits the generalizability of the findings. Data were collected using a validated questionnaire adapted from Selvaraj et al. (2021). One-way ANOVA was used to assess associations, with post-hoc Bonferroni correction and effect size (η^2) calculation.

Results: Education ($F=5.10$, $df=3$, 246 , $p=0.002$, $\eta^2=0.059$) and income ($F=3.30$, $df=3$, 246 , $p=0.019$, $\eta^2=0.039$) were significantly associated with knowledge scores. However, no significant associations were found between any SES variable and attitude or practice scores ($p>0.05$ for all).

Conclusion: While higher education and income were linked to better knowledge, this did not translate into better attitudes or practices. This disconnect highlights the need for public health interventions that target behavioral change directly, moving beyond knowledge dissemination to address the specific barriers in this population.

Key words: Oral Health; Socioeconomic Factors; Health Knowledge, Attitudes, Practice; Health Behavior

Cite as: Sadaqat S, Manan A, Iqbal, MA, Rashid S, Hussain SA, Abdullah A. The association between socioeconomic status and knowledge, attitudes, and practice of oral healthcare in Abbottabad, Pakistan. Journal of Khyber College of Dentistry Mar 2026, Vol. 16, No. 1. <http://doi.org/10.33279/jkcd.v16i01.986>

INTRODUCTION

Oral health is an important component of one's general health and a significant global public health challenge¹. Persons with healthy mouth will be able

to perform their social activities effectively. Poor oral health, including diseases, can affect an individual's quality of life by altering the normal physiology and function of orofacial tissues^{2,3}. In Pakistan, a significant portion of the population resides in rural areas, with recent estimates indicating the rural population constituting about 64% of the total⁴. These communities often face limited access to oral healthcare due to a scarcity of resources, lack of oral health legislation, and low prioritization of dental care. This makes oral health promotion in these communities

Correspondence:

Sadia Rashid

Professor

Department of Physiology, Frontier Dental College Abbottabad

Email: drsadiarizwan@gmail.com

Date Submitted: December 2025

Date Revised: January 2026

Date Accepted: February 2026

particularly challenging and critical^{5,6}. In regions of the sub-continent (Pakistan, Bangladesh, and India), political, socio-economic, education, and income levels shape opportunities and affect oral health knowledge and practice, an issue driven by broader social determinants and a neglect of radical action⁷⁻⁹. Oral health is strongly associated with social and socioeconomic factors, which significantly influence a community's oral health and related quality of life, a disparity particularly prominent in rural areas^{7,10,11}. Socially deprived populations of underdeveloped areas showed higher health problems including poor oral conditions¹²⁻¹⁴. Changing lifestyle factors such as dietary habits (reducing sugar intake), promoting regular oral hygiene practices (twice-daily brushing with fluoride toothpaste), improving attitudes towards preventive dental visits, and enhancing social wellbeing through community-based oral health education programs may be necessary for preventing poor oral conditions like caries, gum diseases.

Everyone should be aware of advantages and disadvantages of maintenance of oral health which is related to proper understanding, approach and practice^{15,16}. Educating dental care from an early young age by the parents as well as in schools and colleges, is an effective and economical way to decrease the prevalence of poor oral health globally¹⁷. Data shows that the education and income levels do affect the knowledge, attitude, and practice of one's oral health. Understanding the relationship between factors like age, sex, occupation, and economy may help identify gaps in oral health knowledge.

This study hypothesized that higher socio-economic status (education, employment, and income) would be positively associated with better knowledge, attitudes, and practices of oral healthcare. Accordingly, this study aimed to assess the association between socioeconomic status and the knowledge, attitudes, and practice (KAP) of oral healthcare among patients visiting a dental hospital in Abbottabad, Pakistan. The findings are important for enhancing oral healthcare awareness thus improving general oral health status of community specially rural residents.

MATERIALS AND METHODS

This was a cross-sectional study conducted at the oral diagnostic department of Frontier medical and Dental College hospital, Abbottabad, Pakistan,

from December 2024 to February 2025. A consecutive convenience sampling technique was used to recruit participants. This non-probability sampling method was chosen due to constraints of time and feasibility. However, it is important to note that this approach may introduce selection bias and limits the generalizability of the findings to the broader population. A formal sample size calculation was not performed; however, the final sample of 250 participants was deemed feasible within the study period and sufficient for the planned bivariate analyses. A total of 250 participants (134 male and 116 female patients) who met the inclusion criteria were selected in a consecutive sequence and the written consent from the participants was taken.

Data Collection: The data were collected manually using a validated questionnaire adopted from previous studies²¹. The questionnaire consisted of four sections covering socio-demographic details, knowledge, attitude, and practice. The socio-demographic section recorded age, gender, education, employment, and annual income. The knowledge section contained 10 items regarding causes of dental caries, gum disease, and preventive measures, with responses recorded as 'Yes,' 'No,' or 'I don't know.' A correct answer was scored 1, while an incorrect or 'don't know' response was scored 0, giving a total knowledge score ranging from 0 to 10. The attitude section contained 5 items assessed on a 5-point Likert scale from 'Strongly Disagree' (1) to 'Strongly Agree' (5), with total attitude scores ranging from 5 to 25, where higher scores indicated a more positive attitude. The practice section contained 5 items related to brushing frequency, toothbrush type, and dental visits, with practice scores calculated based on reported behavior, ranging from 0 to 5, where higher scores indicated better oral health practices.

A pilot study (n=20) was conducted to assess the clarity and reliability of the questionnaire. The internal consistency, measured by Cronbach's alpha, was 0.78 for the knowledge section, 0.75 for attitude, and 0.71 for practice, indicating acceptable reliability.

Socioeconomic variables were operationalized as follows:

- Education was categorized as Uneducated (no formal schooling), Primary school (1-5 years), High school (6-10 years), and University (more than 12 years of education).

- Employment was categorized as Unemployed, Employed (including government and private sector), Homemaker, and Student.

- Monthly Income was categorized in Pakistani Rupees (PKR) as: Below 20,000; 20,000-30,000; 30,001-50,000; and Above 50,000. These categories were based on the national average and minimum wage levels to distinguish between low, lower-middle, upper-middle, and high-income groups

A Microsoft Excel spreadsheet was used to enter the questionnaire data, and SPSS Version 20 was used for statistical analysis. Descriptive statistics were computed for demographic variables. The data were tested for the assumptions of one-way ANOVA. Normality was assessed using the Shapiro-Wilk test, and homogeneity of variances was assessed using Levene's test. One-way ANOVA was used to determine the bivariate associations between each socioeconomic factor (education, employment, income) and the knowledge, attitude, and practice scores. For statistically significant results ($p < 0.05$), post-hoc analyses were performed using the Bonferroni correction to adjust for multiple comparisons. The effect size was calculated using Eta-squared (η^2).

Patients included in the study were adults aged 18 to 80 years, were local residents of the city, and were seeking dental treatment at the study hospital.

Patients under 18 years or over 80 years of age, those who were seriously ill or medically compromised, and patients with intellectual disabilities that prevented them from providing informed consent or understanding the questionnaire were excluded from the study.

Ethical Approval: The College's Ethical Committee granted permission (EC#3337-R-A25) dated: 24/6/2024.

RESULT

The demographic and socioeconomic characteristics of the 250 participants are summarized in Table 1. The sample was predominantly male (53.6%), university-educated (72.4%), and employed (66%). Regarding age distribution, the largest proportion of participants (31.2%) was in the >45 years age group, followed by 28% in the 18-24 years group. For income distribution, the majority of participants (40.4%) reported monthly income above 50,000 PKR, while 12.8% reported income below 20,000

PKR.

Association between socioeconomic status and oral health knowledge scores: Table 2 presents the association of socioeconomic status variables and oral health knowledge scores. Education showed a statistically significant association with knowledge scores, $F(3, 246) = 5.10, p = 0.002$, with a small effect size ($\eta^2 = 0.059$). Participants with university education (mean=8.19, SD=1.10) demonstrated higher knowledge scores compared to those with primary school education (mean=7.18, SD=1.97). Similarly, income was significantly associated with knowledge scores, $F(3, 246) = 3.30, p = 0.019, \eta^2 = 0.039$.

Notably, the post-hoc Bonferroni test did not identify specific pairwise differences between educational groups. For example, the uneducated group ($n=16$) demonstrated a mean knowledge score equivalent to the university-educated group, a finding that warrants cautious interpretation due to the small sample size of the former. Thus a limitation of the current study.

Association between socioeconomic status and oral health attitude scores: Table 3 highlights relationship between socioeconomic status and the attitude of Patients towards oral healthcare. No

Table 1: Represents the distribution of study population based on various demographic parameters

Variable	Categories	n	%
Sex	Female	116	46.4
	Male	134	53.6
Age (years)	18-24	70	28
	25-34	49	19.6
	35-44	53	21.2
	>45	78	31.2
Education	Uneducated	16	6.4
	Primary school	21	8.4
	High school	32	12.8
	University	181	72.4
Employment	Unemployed	15	6
	Employed	165	66
	Homemaker	35	14
	Student	35	14
Income (PKR)	Below 20k	32	12.8
	20k-30k	62	24.8
	30k-50k	55	22
	> 50k	101	40.4

The association between socioeconomic status and knowledge, attitudes.....

Table 2: Association between socioeconomic status and oral health knowledge scores

Socio-economic status		Mean	Std. Deviation	F-value	df	p-value	η ² (effect size)
Education	Uneducated	8.20	1.32	5.10	3, 246	p =0.002*	0.059
	Primary school	7.18	1.97				
	High school	7.62	1.75				
	University	8.19	1.10				
Employment	Unemployed	7.87	1.46	1.01	3, 246	p =0.386	0.012
	Homemaker	8.00	1.49				
	Student	7.71	1.52				
	Employed	8.13	1.25				
Income	Below 20k	7.97	1.35	3.30	3, 246	p =0.019*	0.039
	20k-30k	7.63	1.52				
	30k-50k	8.38	1.04				
	Above 50k	8.12	1.31				

p < 0.05, One-way ANOVA. η² (Eta-squared) represents the effect size, interpreted as: small (≥0.01), medium (≥0.06), or large (≥0.14).* Asterisk denotes statistically significant p-values.

Table 3: Association between socioeconomic status and oral health attitude scores

Socio-economic status		Mean	Std. Deviation	F-value	df	p-value	η ² (effect size)
Education	Uneducated	4.13	0.99	1.45	3, 246	p =0.229 (NS)	0.017
	Primary school	3.81	1.33				
	High school	4.46	1.29				
	University	4.26	1.13				
Employment	Unemployed	3.73	1.39	1.48	3, 246	p =0.222 (NS)	0.018
	Homemaker	4.25	1.09				
	Student	4.48	1.24				
	Employed	4.23	1.14				
Income	Below 20k	4.19	1.42	1.02	3, 246	p =0.397 (NS)	0.012
	20k-30k	4.14	1.19				
	30k-50k	4.11	1.06				
	Above 50k	4.39	1.10				

One-way ANOVA; all results were statistically non-significant (p > 0.05). η² (Eta-squared) represents the effect size

Table 4: Association between socioeconomic status and oral health practice scores

Socio-economic status		Mean	Std. Deviation	F-value	df	p-value	η ² (effect size)
Education	Uneducated	2.07	1.71	0.58	3, 246	p =0.659 (NS)	0.007
	Primary school	1.95	1.21				
	High school	2.37	1.49				
	University	2.13	1.19				
Employment	Unemployed	1.80	1.32	1.14	3, 246	p =0.334 (NS)	0.014
	Homemaker	2.06	1.28				
	Student	2.46	1.15				
	Employed	2.13	1.29				
Income	Below 20k	2.28	1.30	1.36	3, 246	p =0.258 (NS)	0.016
	20k-30k	2.34	1.44				
	30k-50k	1.89	1.01				
	Above 50k	2.12	1.27				

One-way ANOVA; all results were statistically non-significant (p > 0.05). η² (Eta-squared) represents the effect size.

socio-economic factor (Education, Employment, Income) showed statistically significant association with attitude scores ($p > 0.05$ for all). The highest mean attitude score was observed among students (mean=4.48, SD=1.24), while the lowest was among unemployed participants (mean=3.73, SD=1.39). However, these differences were not statistically significant.

Association between socioeconomic status and oral health practice scores: Table 4 Shows the Association between socioeconomic status of participants and their Practice of oral care. No socioeconomic factor demonstrated a statistically significant association with practice scores ($p > 0.05$ for all).

DISCUSSION

This study revealed a notable disconnect between oral health knowledge and its translation into positive attitudes and practices among patients in Abbottabad, Pakistan. While higher education and income were associated with better knowledge scores, these advantages did not extend to attitudes or practices, highlighting a critical gap that requires targeted behavioral interventions.

Proper knowledge, a positive attitude and practical steps are key aspects of maintaining good oral health. Our study assessed the knowledge, attitudes and practical approaches and any changes with the socio-economic status of the patients reporting to the oral diagnostic department (OPD). We observed, that people had some knowledge about oral healthcare, but their attitude and the practice towards maintaining good oral care were poor regardless of socio-economic status. This finding aligns with the known Knowledge-Attitude-Practice (KAP) gap in oral health, where knowledge alone does not reliably translate into improved attitudes or behaviors, a phenomenon often described as the 'intention-behavior gap'^{18,19}. It may be due to the deficiency in proper awareness and lack of practical approach towards oral healthcare⁶.

The present study demonstrated that knowledge was significantly higher among participants with university education compared to those with lower educational attainment. While our study and others confirm that higher education and income are linked to better knowledge, this did not translate into better attitudes or practices in our cohort, highlighting a

critical barrier^{10,20,21}. Similarly, the employed group showed less variability in their knowledge scores (SD = 1.25) compared to other groups, suggesting a more consistent baseline of information. This finding was consistent with previous studies⁵. The association between person's socioeconomic status and their attitude towards oral health was not statistically significant at $p < 0.05$, indicating no relationship between oral healthcare attitude and socioeconomic status of the participants. Even though the majority of educated individuals knew that dental healthcare enhances oro-facial profile and appearance, they still demonstrated poor attitude and practical approach towards oral healthcare^{5,22,23}.

Similarly, the association between socioeconomic status and oral healthcare practice was not significant ($p < 0.05$). Thus there was no relation between oral healthcare practice and socioeconomic status in this population. They demonstrated almost similar approach regardless of socio-economic conditions. These findings were consistent with other studies in similar settings, which also reported a persistent gap between socioeconomic status, knowledge, and actual oral health behaviors^{5,19,11,22}.

Interestingly, the uneducated group had a mean knowledge score equivalent to the university-educated group. This unexpected finding may be due to the very small sample size of the uneducated group ($n=16$), making it prone to volatility, or it might suggest that core oral health knowledge in this context was acquired through non-formal channels, such as family, community, or media, rather than formal education alone.

LIMITATIONS

This study had several limitations. First, the use of a convenience sample from a single dental hospital, comprising predominantly highly-educated individuals, limited the generalizability of our findings to the wider population and introduced a potential for selection bias. Additionally, the absence of a formal sample size calculation was a methodological limitation. Second, the cross-sectional design precluded any causal inferences. Third, the primary analysis used one-way ANOVA without controlling for potential confounders like age and gender. Future studies should employ multivariate models to confirm the independent effect of each socioeconomic factor. Finally, data on oral health

practices were self-reported, which was susceptible to social desirability bias—a tendency of participants to overreport positive behaviors (such as brushing frequency) or underreport negative behaviors to align with perceived social expectations.

CONCLUSION

In this sample of patients from a single dental OPD, higher education and income were associated with better knowledge of oral health. However, this knowledge was not consistently translated into more positive attitudes or better practices across different socioeconomic groups. This disconnect suggests that interventions should move beyond simple knowledge dissemination to directly target behavioral change.

RECOMMENDATIONS

We recommend that comprehensive oral health-care-related training, aligned with a modern, holistic definition of oral health, be prioritized from early school to university curriculum and in community areas to promote knowledge, attitude, and practice regardless of socioeconomic status²⁴.

REFERENCES

1. Peres MA, Macpherson LMD, Weyant RJ, Daly B, Venturelli R, Mathur MR, et al. Oral diseases: a global public health challenge. *Lancet*. 2019 Jul 20;394(10194):249–60.
2. Izhar F, Nazir MA, Majeed A, Almas K. Knowledge and practice of dentine hypersensitivity among general dental practitioners. *Eur J Dent*. 2019 Oct;13(4):540–6. DOI: 10.1055/s-0039-1697656.
3. Ashi H, Campus G, Bertéus Forslund H, Hafiz W, Ahmed N, Lingström P. The Influence of Sweet Taste Perception on Dietary Intake in Relation to Dental Caries and BMI in Saudi Arabian Schoolchildren. *Int J Dent*. 2017;2017:4262053. DOI: 10.1155/2017/4262053.
4. World Bank. Rural population (% of total population) - Pakistan. 2023. Data. Retrieved from: <https://data.worldbank.org/indicator/SP.RUR.TOTL.ZS?locations=PK>
5. Adeel M, Tariq M, Riaz B, Aziz R, Irshad A. Knowledge, attitude and practice regarding dental hygiene in patients of Sialkot and Multan Pakistan. *PJMHS*. 2022 Jan;16(1):167–8.
6. Bhat M, Bhat S, Brondani MA, Mejia GC, Pradhan A, Roberts-Thomson KF, et al. Prevalence, Extent, and Severity of Oral Health Impacts Among Adults in Rural Karnataka, India. *JDR Clin Trans Res*. 2021 Apr;6(2):242–50. DOI: 10.1177/2380084420921359.
7. Watt RG, Daly B, Allison P, Macpherson LMD, Venturelli R, Listl S, et al. Ending the neglect of global oral health: time for radical action. *Lancet*. 2019 Jul 20; 394(10194):261–72.
8. Jain N, Dutt U, Radenkov I, Jain S. WHO's Global Oral Health Status Report 2022: Implications for India and South Asia. *Cureus*. 2023 Feb 11;15(2):e34651. DOI: 10.7759/cureus.34651.
9. Batra P, Saini P, Yadav V. Oral health concerns in India. *J Oral Biol Craniofac Res*. 2020 Apr-Jun;10(2):171–4. DOI: 10.1016/j.jobcr.2020.03.003.
10. Schuch HS, Haag DG, Kapellas K, Arantes R, Peres MA, Thomson WM, et al. The Relative Impact of Income and Education on Oral Health—A Cross-Sectional Study of the Brazilian Longitudinal Health Study. *Community Dent Oral Epidemiol*. 2021 Jun;49(3):209–15. DOI: 10.1111/cdoe.12593.
11. Ali SA, Aslam A, Farid J, Shah M, Jamal S, Shaikh BT. Oral health-related quality of life and its associated factors among adults in rural and urban areas of Pakistan. *PLoS One*. 2023 Apr 6; 18(4): e0284567. DOI: 10.1371/journal.pone.0284567.
12. Dalai S, Tangade P, Singh V, Jain A, Priyadarshi S, Yadav J. Oral Health-Related Quality of Life Among Urban and Rural Adults of Uttar Pradesh: A Cross-Sectional Study. *J Prim Care Dent Oral Health*. 2022; 3(3):75–81.
13. Pearce J, Witten K, Hiscock R, Blakely T. Regional and urban–rural variations in the association of neighbourhood deprivation with community resource access: a national study. *Environ Plan A*. 2008 Nov; 40(10):2469–89. DOI: 10.1068/a39285.
14. Sanadhya S, Aapaliya P, Jain S, Sharma N, Choudhary G, Dobaria N. Assessment and comparison of clinical dental status and its impact on oral health-related quality of life among rural and urban adults of Udaipur, India: A cross-sectional study. *J Basic Clin Pharm*. 2015 Mar; 6(2): 50–8. DOI: 10.4103/0976-0105.152091.
15. Cademartori MG, Custódio NB, Harter AL, Goettems ML. Maternal perception about child oral health is associated to child dental caries and to maternal self-report about oral health. *Acta Odontol Scand*. 2019 Jul; 77(5): 359–63. DOI: 10.1080/00016357.2019.1572792.
16. Tinanoff N, Baez RJ, Diaz Guillory C, Donly KJ, Feldens CA, McGrath C, et al. Early childhood caries epidemiology, aetiology, risk assessment, societal burden, management, education, and policy: Global perspective. *Int J Paediatr Dent*. 2019 May;29(3):238–48. DOI: 10.1111/ipd.12484.
17. World Health Organization. Global oral health status report: towards universal health coverage for oral health by 2030. Geneva: World Health Organization; 2022.
18. Rajan PK, John J. Explaining the Knowledge-Attitude-Practice Gap in Oral Health: A Scoping Review. *J Oral Health Community Dent*. 2022; 16(4):1–7.

19. Kumar S, Tadakamadla J, Zimmer-Gembeck MJ, Kroon J, Lalloo R, Johnson NW. The Intention-Behavior Gap in Oral Health: A Cross-Sectional Study of Young Adults. *Int J Environ Res Public Health*. 2020 Oct 6; 17(19):7299. DOI: 10.3390/ijerph17197299.
20. Kandasamy G, Almeleebia TM. Assessment of Oral Health Knowledge, Attitudes, and Behaviours among University Students in the Asir Region—Saudi Arabia: A Cross-Sectional Study. *Healthcare (Basel)*. 2023 Dec 5; 11(23):3100. DOI: 10.3390/healthcare11233100.
21. Iqbal MA, Rashid S, Rizwan M, Ch WG, Sheikh QM, Noor A. Awareness, Attitude and Practice of keeping proper oral hygiene among the Medical and Dental students. *PJMHS*. 2022 Apr; 16(4):131–2.
22. Selvaraj S, Naing NN, Wan-Arfah N, Abreu MHNG. Assessment on oral health knowledge, attitude, and behavior and its association with socio-demographic and habitual factors of South Indian population. *Pesqui Bras Odontopediatria Clin Integr*. 2021; 21:e0135. DOI: 10.1590/pboci.2021.100.
23. FDI World Dental Federation. Oral health and the sustainable development goals. Geneva: FDI World Dental Federation; 2019.
24. Glick M, Williams DM, Kleinman DV, Vujcic M, Watt RG, Weyant RJ. A new definition for oral health developed by the FDI World Dental Federation opens the door to a universal definition of oral health. *J Am Dent Assoc*. 2021 May; 152(5): 367-9. DOI: 10.1016/j.adaj.2021.02.008.

CONFLICT OF INTEREST
Authors declare no conflict of interest.
GRANT SUPPORT AND FINANCIAL DISCLOSURE
None declared.

AUTHORS' CONTRIBUTION

The following authors have made substantial contributions to the manuscript as under:

Conception or Design: SS, AM, MAI, SR, SAH, AA

Acquisition, Analysis or Interpretation of Data: SS, AM, MAI, SR, SAH, AA

Manuscript Writing & Approval: SS, AM, MAI, SR, SAH, AA

All the authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.



Saveela Sadaqat, et al. This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License, which permits unrestricted use, distribution & reproduction in any medium provided that original work is cited properly.